mikroProg™ for PIC®, dsPIC® and PIC32®

mikroProg™ is a fast USB programmer with mikroICD™ hardware In-Circuit Debugger support. Smart engineering allows mikroProg to support PIC10®, PIC12®, PIC16®, PIC18®, dsPIC30/33®, PIC24® and PIC32® devices in a single programmer!



MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

TO OUR VALUED CUSTOMERS

I want to express my thanks to you for being interested in our products and for having confidence in MikroElektronika.

The primary aim of our company is to design and produce high quality electronic products and to constantly improve the performance thereof in order to better suit your needs.

Nebojsa Matic
General Manager

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Introduction to mikroProg™



mikroProg™ for PIC®, dsPIC® and PIC32® represents **fast** and **reliable** programmer with **ICD** support. Specially designed firmware allows programming of all Microchip® microcontrollers: **PIC®**, **dsPIC®, PIC24®** and **PIC32®**. And there's no need for firmware change each time you select a new microcontroller architecture because mikroProg™ firmware takes care of all supported architectures. Supporting new microcontrollers is easy. Just by downloading the latest version of **mikroProg Suite™ for PIC®** your programmer is ready to program new devices.

Key features

- **In-Circuit Debugging** (**ICD**).
- One firmware for **PIC®**, **dsPIC®, PIC24®** and **PIC32®** microcontroller families
- New microcontrollers support via latest version of **mikroProg™ Suite for PIC®** software
- Can provide power supply for target device



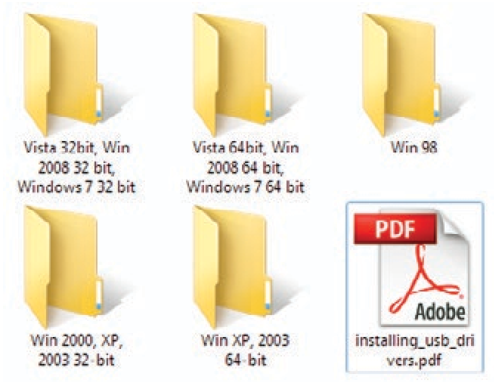
01 Flat cable
02 USB MINIB connector
03 DATA transfer indication LED
04 ACTIVE indication LED
05 LINK indication LED
06 POWER indication LED

1. Driver installation

mikroProg™ requires drivers in order to work. Drivers are located on the link bellow:

http://www.mikroe.com/downloads/get/1202/mikroprog_for_pic_drivers_v200.zip

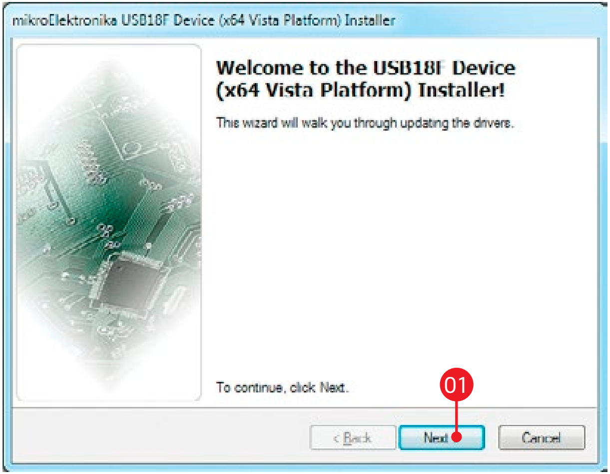
When you locate the drivers, please extract files from the ZIP archive. Folder with extracted files contains folders with drivers for different operating systems. Depending on which operating system you use, choose adequate folder and open it.



In the opened folder you should be able to locate the driver setup file. Double click on setup file to begin installation of the programmer drivers.

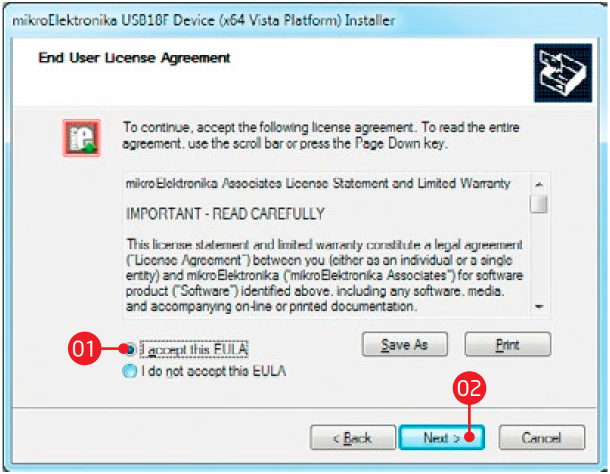


step 1 - Start installation



01 In welcome screen click on **Next>** button

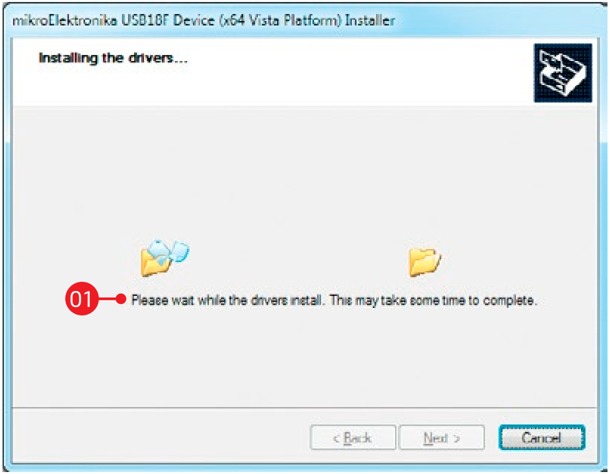
step 2 - Accept EULA



01 In order to proceed select: I accept the this EULA (End User License Agreement)

02 Click **Next>** button

step 3 - Installing the drivers



01 Drivers are installed automatically

step 4 - Finish installation



01 Click on **Finish** button to end installation process

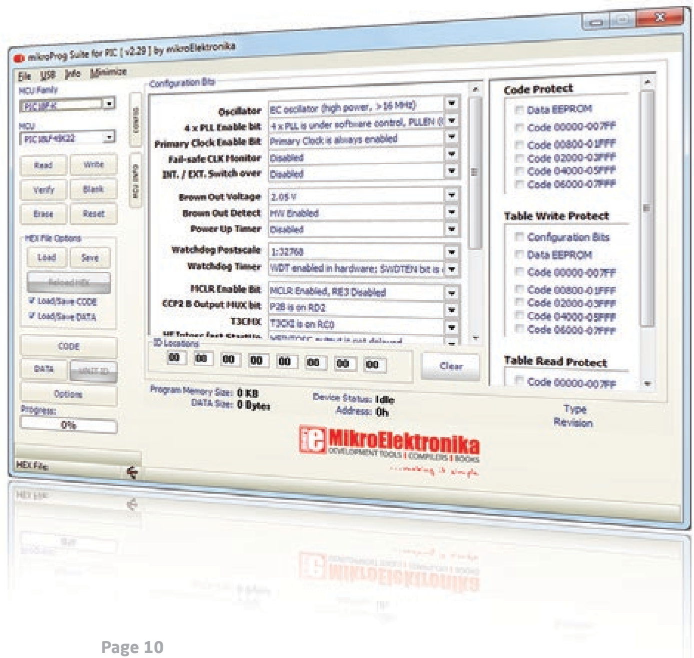
2. Connecting to a PC



After driver installation is complete, you can now connect the programmer with your PC using USB cable provided with the package. Green **POWER LED** should turn ON, indicating the presence of power supply. Amber-colored **LINK LED** will turn ON when link between mikroProg™ and PC is established. Link can be established only when correct drivers are installed on your PC.

3. mikroProg Suite™ for PIC® software

mikroProg Suite™ for PIC® software is intended for programming **PIC®**, **dsPIC®**, **PIC24®** and **PIC32®** microcontrollers from Microchip®. The graphic interface of this program is clear and easy-to-use, which makes the use of this program faster. The program's main window includes basic options for programming microcontrollers. In addition, there are advanced programming options that enable experienced users to set configuration bits on their own. The program includes views providing basic information about the selected MCU, voltage monitoring, etc.



4. Powering target device via mikroProg™

One of the key benefits of mikroProg™ is that is can power your target device. You can set power supply voltage in range from **2.7V** to **5V** with output current up to **250mA**. This option is activated from **mikroProg Suite™ for PIC® (v2.29)** software. Click the MCU Info button to display **Voltage Options** section. First you must select MCU family and choose your target MCU from a dropdown list. mikroProg™ will automatically set the default value of power supply for your MCU. You can also manually set voltage supply value by moving slider under mikroProg Suite™ for PIC® window, **Figure 4-1**.

To enable power supply, first set desired voltage and then click on check box **"Power board from programmer"**.

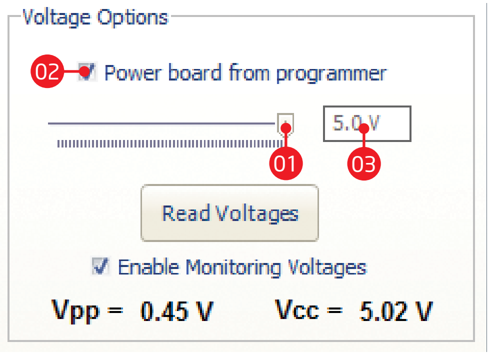


Figure 4-1: Voltage options

- 01 Setting supply voltage value from 2.7 to 5V (max 250mA)
- 02 Check box for enabling supply voltage from programmer
- 03 Box with selected supply voltage

5. Connecting with a target device

For connection with a target device mikroProg™ uses female IDC10 connector, **Figure 5-1**. In order to make proper connection with the target board it is necessary to pay attention to IDC10 connector pinout. Every pin has a different purpose and for easy orientation IDC10 connector is marked with a little knob and incision, **Figure 5- 2**.

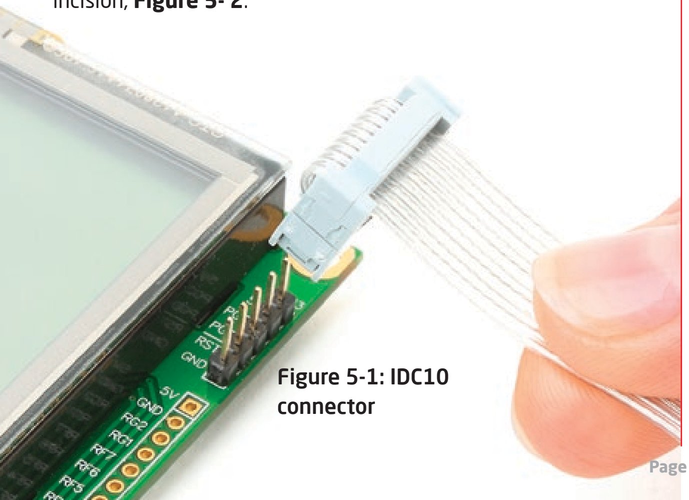
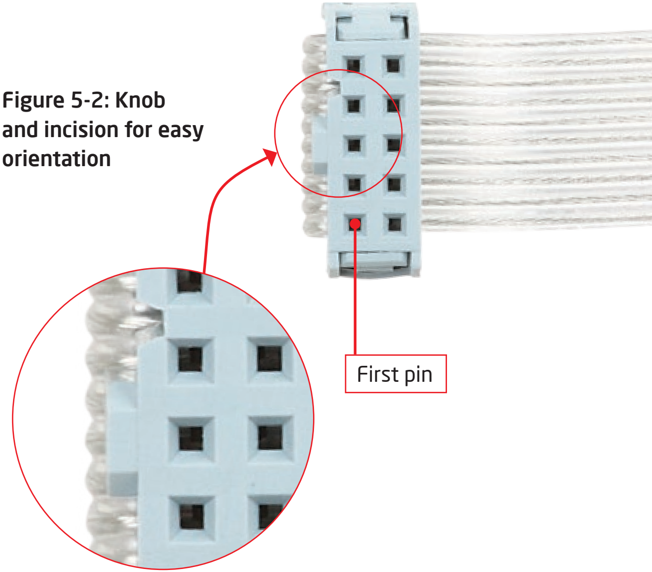


Figure 5-1: IDC10 connector

Figure 5-2: Knob and incision for easy orientation



Front side of IDC10 connector is marked with a knob and incision. Front side holds PGC, PGD and MCLR pins which are used for microcontroller programming.

6. IDC10 Pinout

01 **MCU-VCC** - MCU power supply

03 **MCU-PGC** - Serial programming clock

05 **MCU-PGD** - Serial programming data

07 **MCU-MCLR** - Master clear/Programming voltage

09 **GND** - Ground

02 VCC

04 PGC

06 PGD

08 MCLR

10 GND

These pins are multiplexed (see section 8.0 for more information)

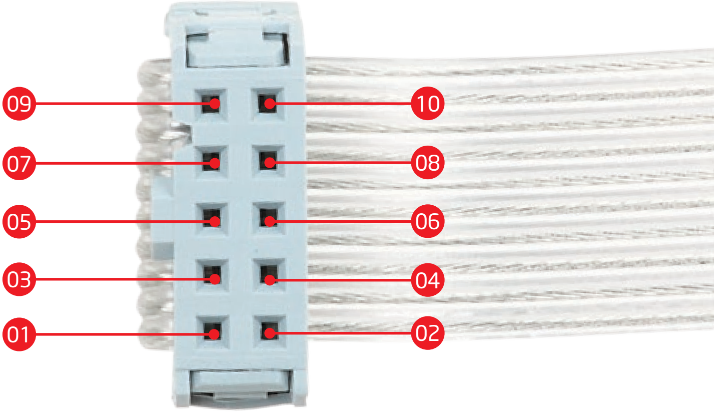
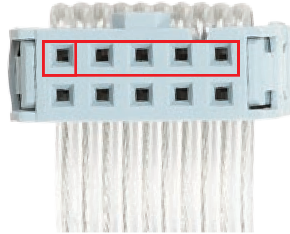


Figure 6-1: IDC10 pinout

7. Connection examples

For connecting mikroProg™ with your target device a best solution is to provide 1x5 or 2x5 male headers which are connected with programing pins on microcontroller. You can see several examples of connection schematics in the **Section 10** of this manual.

Figure 7-1: Use only front row for programming



Using 1x5 male headers

When connecting mikroProg™ with your device via 1x5 header make sure to use front side of IDC10 connector (side with a knob and incision), **Figure 7-2**. 1x5 programming headers are found in some of Mikroelektronika products, like mikromedia boards, **Figure 7-2.**

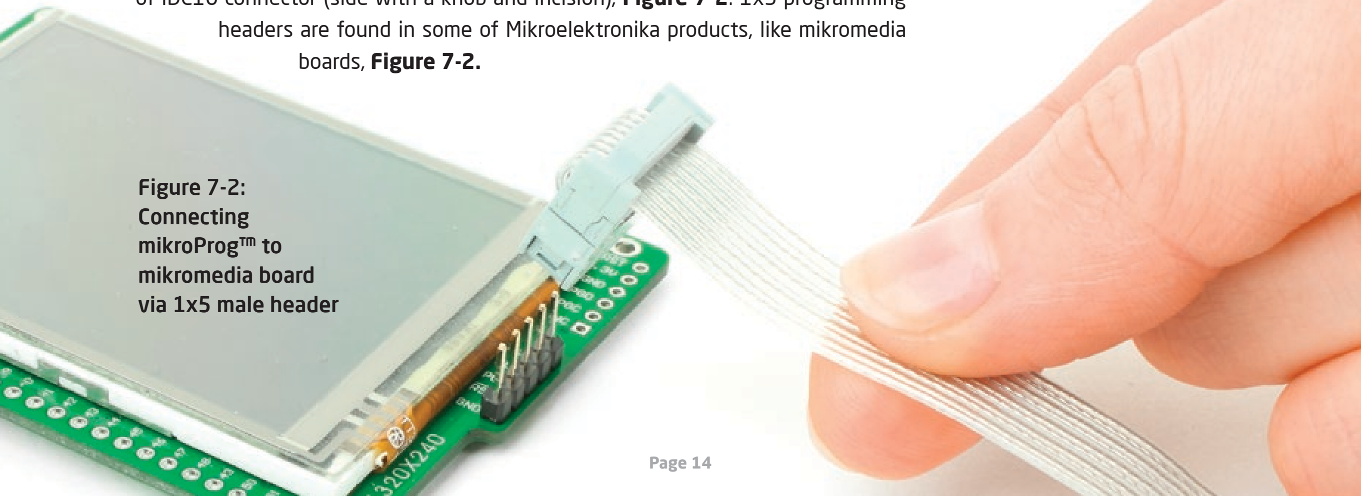


Figure 7-2: Connecting mikroProg™ to mikromedia board via 1x5 male header

Using 2x5 male headers

By using 2x5 male connector in your device you can exploit the multiplexing feature of mikroProg™ for PIC®, dsPIC® and PIC32®. We'll explain how multiplexer operates and what are it's key benefits in **Section 8** of this manual.

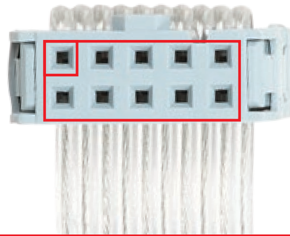


Figure 7-3: Use entire IDC10 connector for multiplexing feature

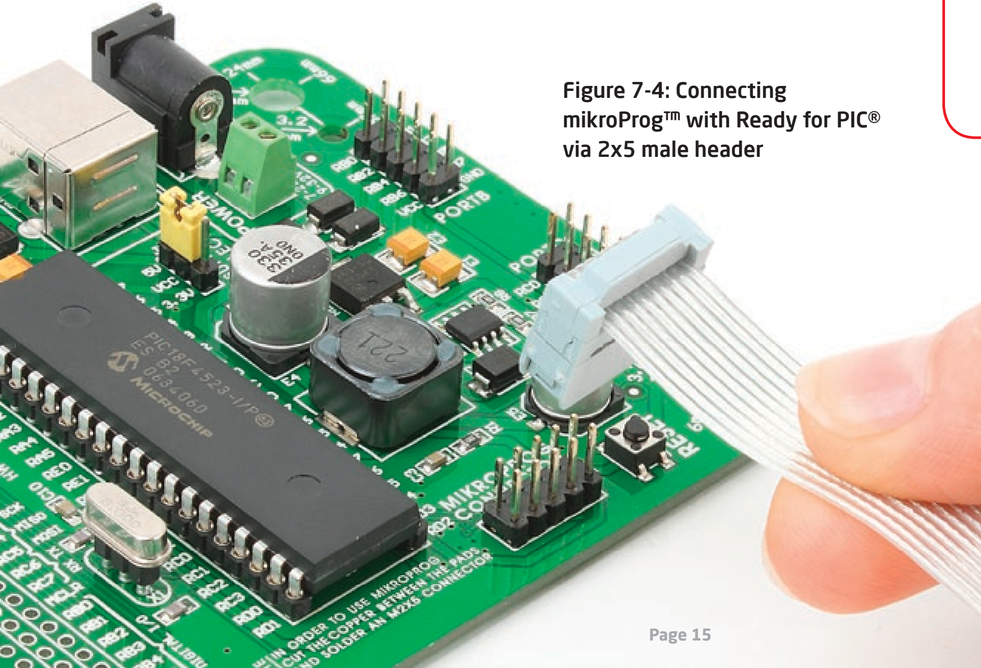


Figure 7-4: Connecting mikroProg™ with Ready for PIC® via 2x5 male header

8. Multiplexer

Programming pins or I/Os?

Multiplexer is specially designed circuit which serves as a switch. Purpose of multiplexer is that there's no need for disconnecting mikroProg™ programmer from a device when programming is finished. Multiplexing is always available, but can only be used with 2x5 male header on target board as shown on **Figure 8-1.** Multiplexer allows the usage of programming pins (PGC and PGD) as I/O lines when not in programming/debugging mode. Master clear reset (MCLR) pin is also multiplexed and can be used for resetting target MCU when not in programming/ debugging mode.

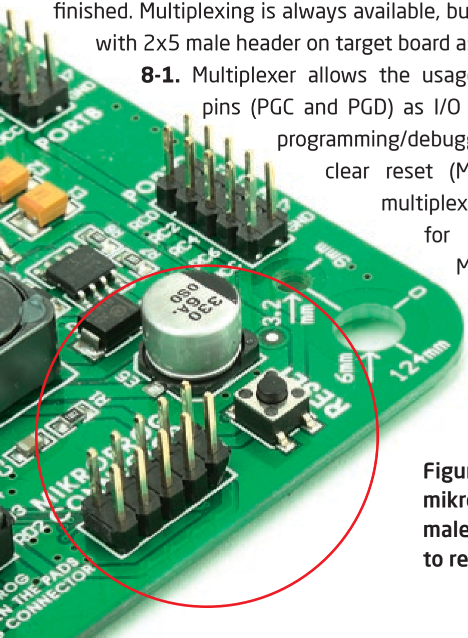


Figure 8-1: mikroProg™ 2x5 male header next to reset button

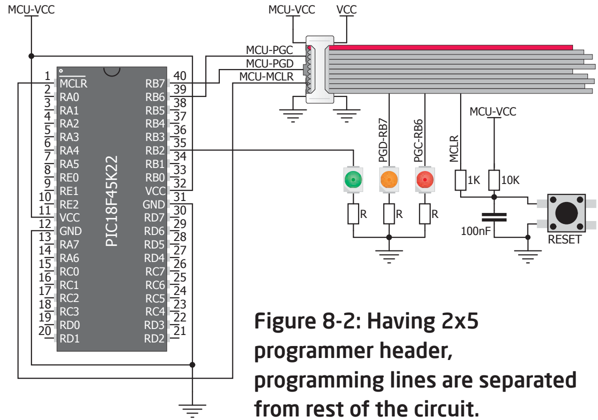


Figure 8-2: Having 2x5 programmer header, programming lines are separated from rest of the circuit.

While pins on MCU are separated from rest of the circuit, they can not be used as I/O or reset pins as shown on **Figure 8-2**. There are two ways to connect programming pins: 1. with mikroProg™ 2x5 female connector 2. by placing jumpers over 2x5 male header.

Multiplexer decides pin function

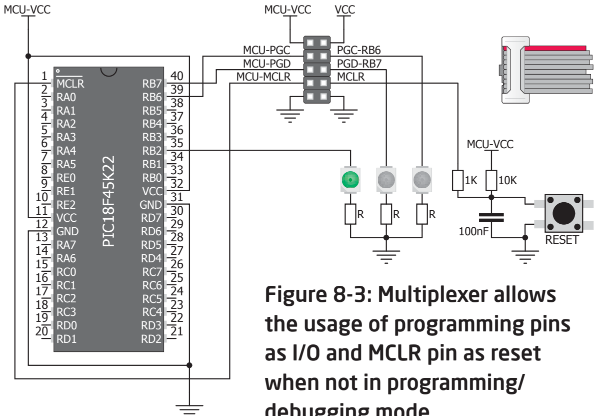


Figure 8-3: Multiplexer allows the usage of programming pins as I/O and MCLR pin as reset when not in programming/ debugging mode

Programming pins just as I/Os

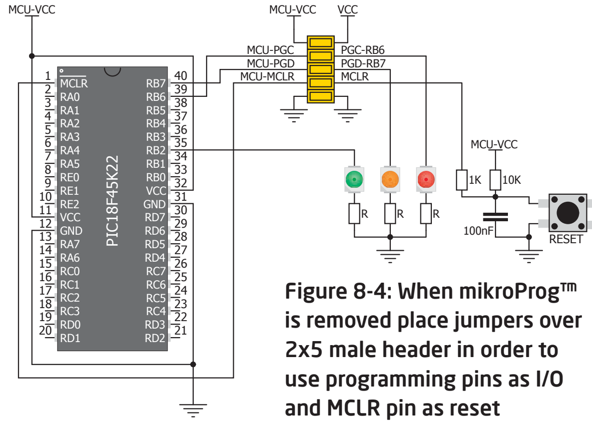


Figure 8-4: When mikroProg™ is removed place jumpers over 2x5 male header in order to use programming pins as I/O and MCLR pin as reset

Programming/debugging is enabled when mikroProg™ is connected to the device. As shown on **Figure 8-3**, when programming/debugging is finished, multiplexer reconnects programming/debugging pins so they can be used as I/Os. There's no need to remove mikroProg™ connector. When mikroProg™ is removed, place jumpers over 2x5 male header in order to use programming/debugging pins as I/O, and MCLR pin as reset (**Figure 8-4**). In programming/debugging mode MCLR pin is used by mikroProg™, otherwise it is used by MCU.

Multiplexer in idle mode

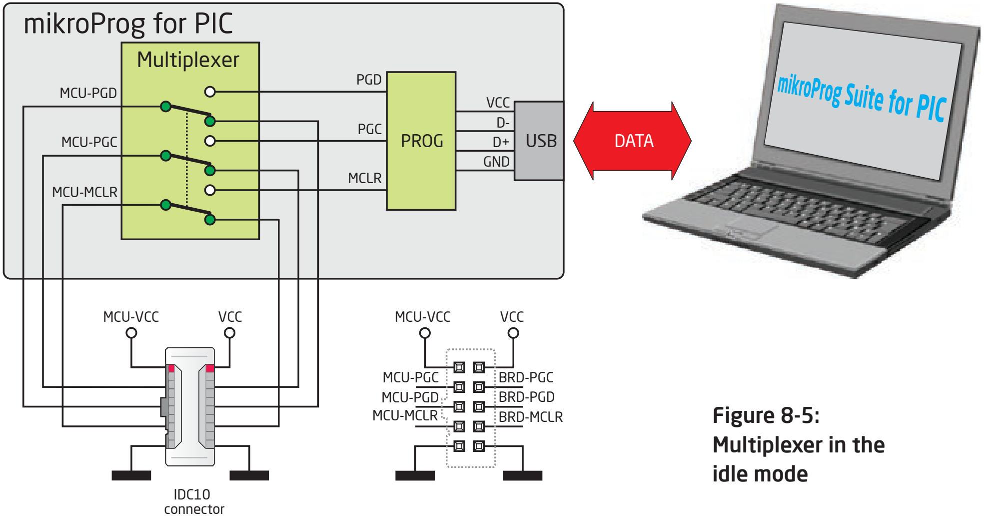


Figure 8-5: Multiplexer in the idle mode

When programming/debugging is not in progress, the multiplexer releases the programming pins and MCLR, thus enabling them to be used as I/O pins or reset. This also enables the programmer to be connected to the target device without affecting its operation.

Multiplexer in programming/debugging mode

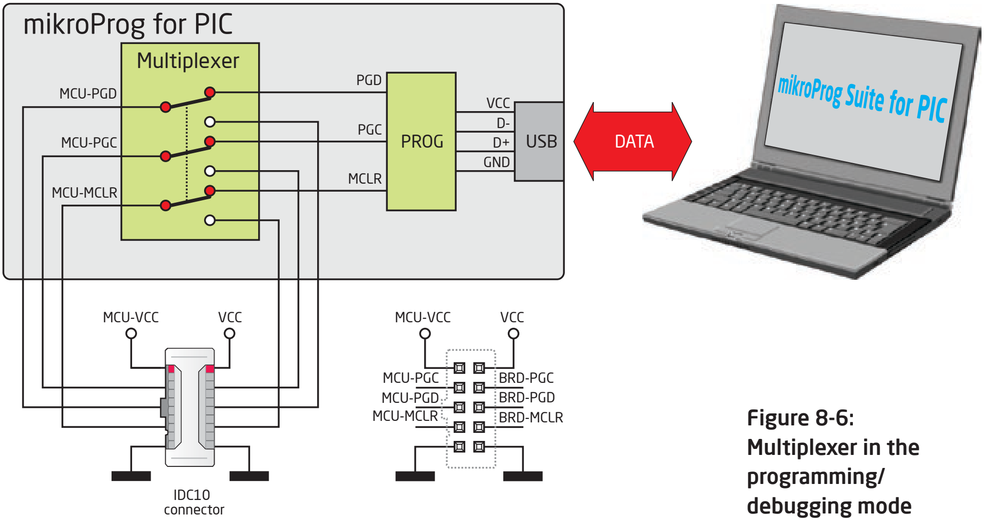
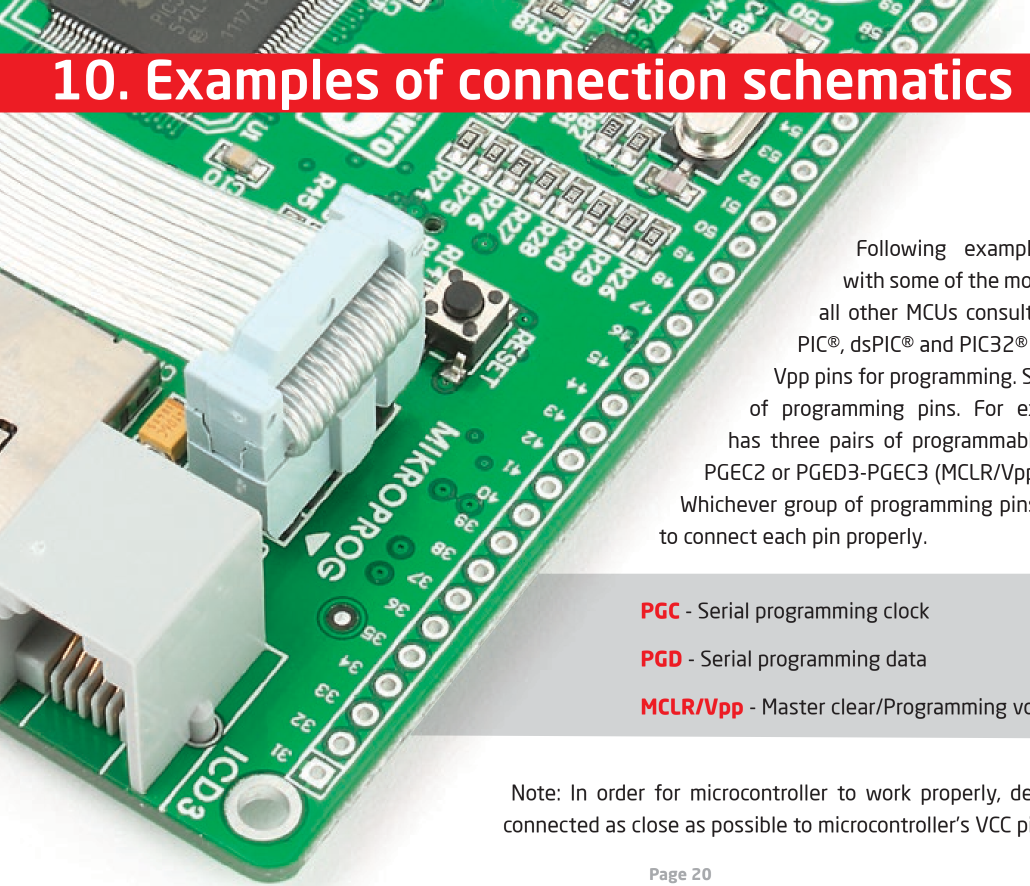


Figure 8-6: Multiplexer in the programming/ debugging mode

During programming/debugging, the multiplexer disconnects the microcontroller pins used for programming/debugging from the target device. This enables the programming/debugging process to be safely performed without affecting the operation of the device itself. It also prevents external signals from affecting the programming/debugging process. When the programming/debugging process has been completed, the multiplexer releases the microcontroller pins used for programming, so that they can be used as I/O pins or reset respectively.

10. Examples of connection schematics



Following examples demonstrate connections with some of the most popular supported MCUs. For all other MCUs consult manufacturer's datasheet. All PIC®, dsPIC® and PIC32® MCUs use PGC, PGD and MCLR/Vpp pins for programming. Some MCUs have several groups of programming pins. For example dsPIC33FJ128GP710A has three pairs of programmable pins PGED1-PGEC1, PGED2-PGEC2 or PGED3-PGEC3 (MCLR/Vpp pin is same for all pin groups). Whichever group of programming pins you decide to use, make sure to connect each pin properly.

PGC - Serial programming clock

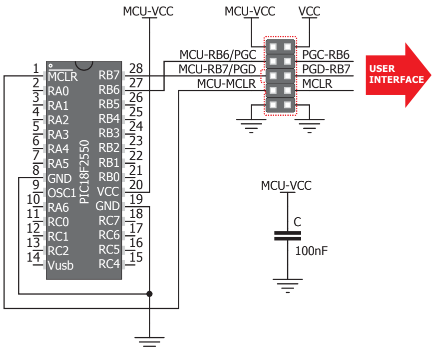
PGD - Serial programming data

MCLR/Vpp - Master clear/Programming voltage

Note: In order for microcontroller to work properly, decoupling capacitors must be connected as close as possible to microcontroller's VCC pins.

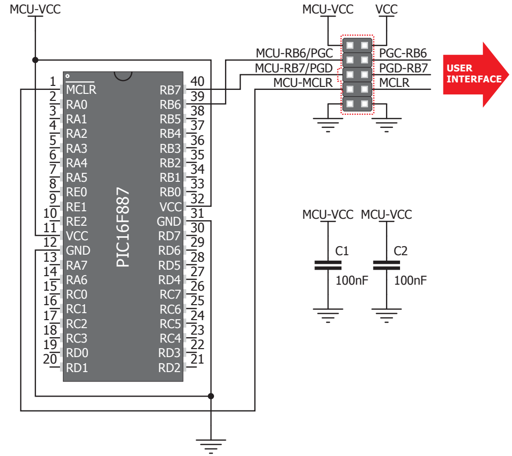
PIC DIP28

Figure 10-1: Connecting 2x5 male header with PIC18F2550 in 28-pin DIP package



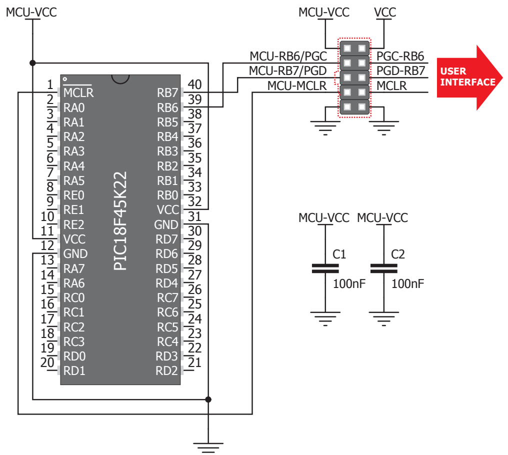
PIC DIP40

Figure 10-2: Connecting 2x5 male header with PIC16F887 in 40-pin DIP package



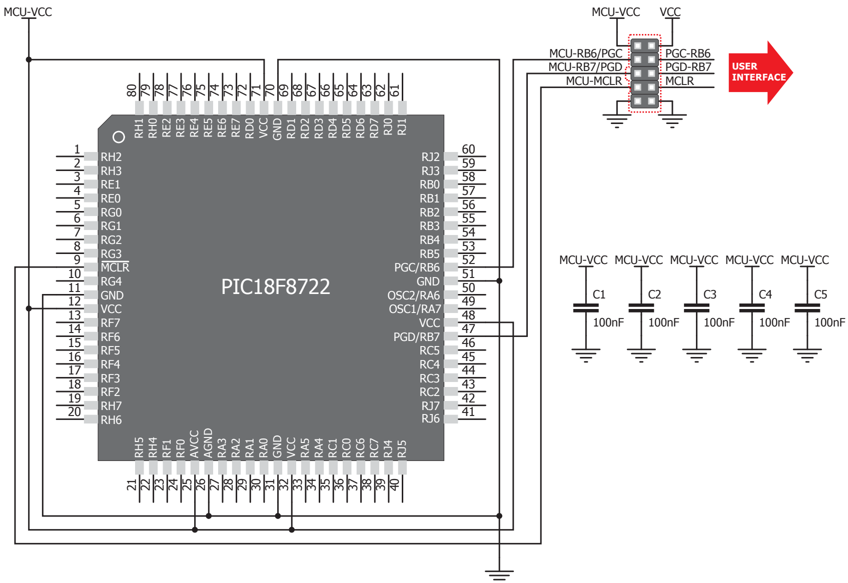
PIC18FK DIP40

Figure 10-3: Connecting 2x5 male header with PIC18F45K22 in 40-pin DIP package



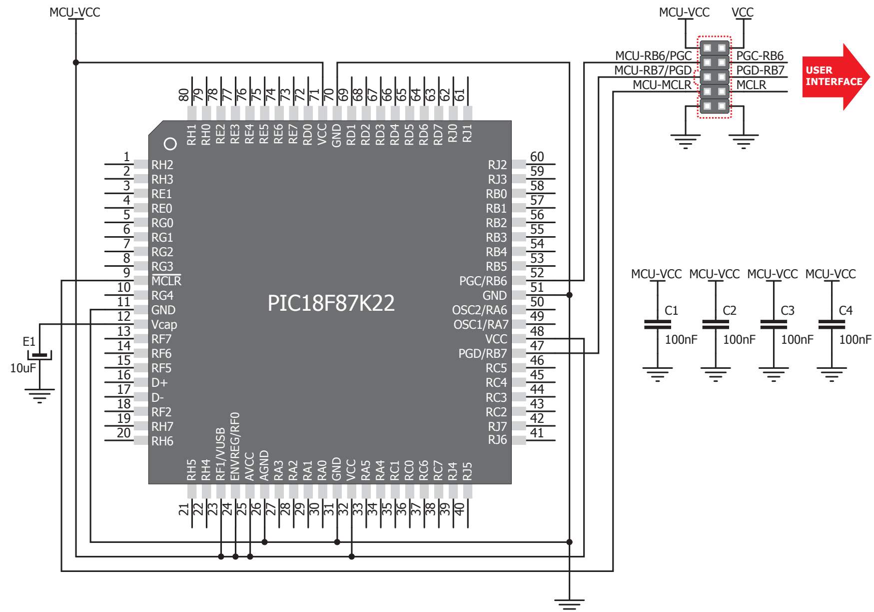
PIC18F TQFP80

Figure 10-4: Connecting 2x5 male header with PIC18F8722 in 80-pin TQFP package



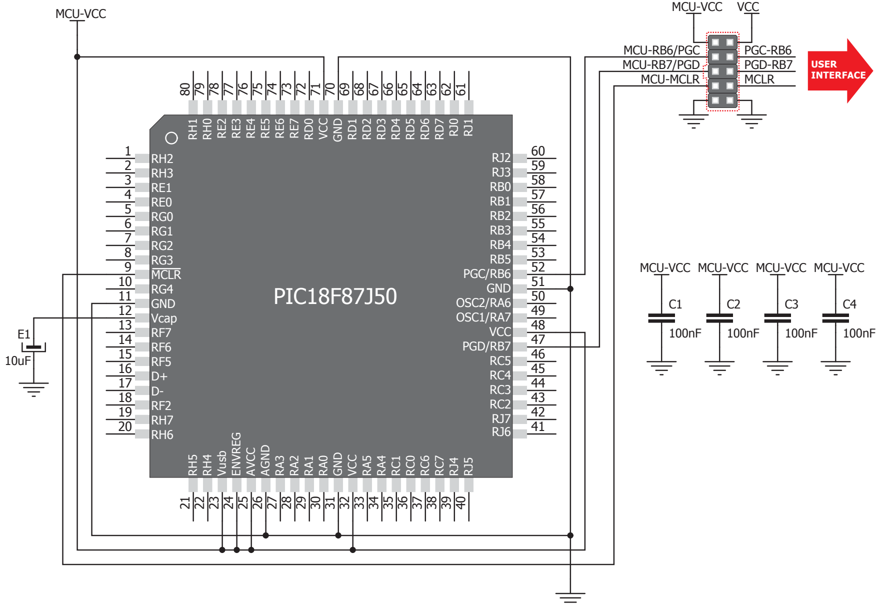
PIC18FK TQFP80

Figure 10-5: Connecting 2x5 male header with PIC18F87K22 in 80-pin TQFP package



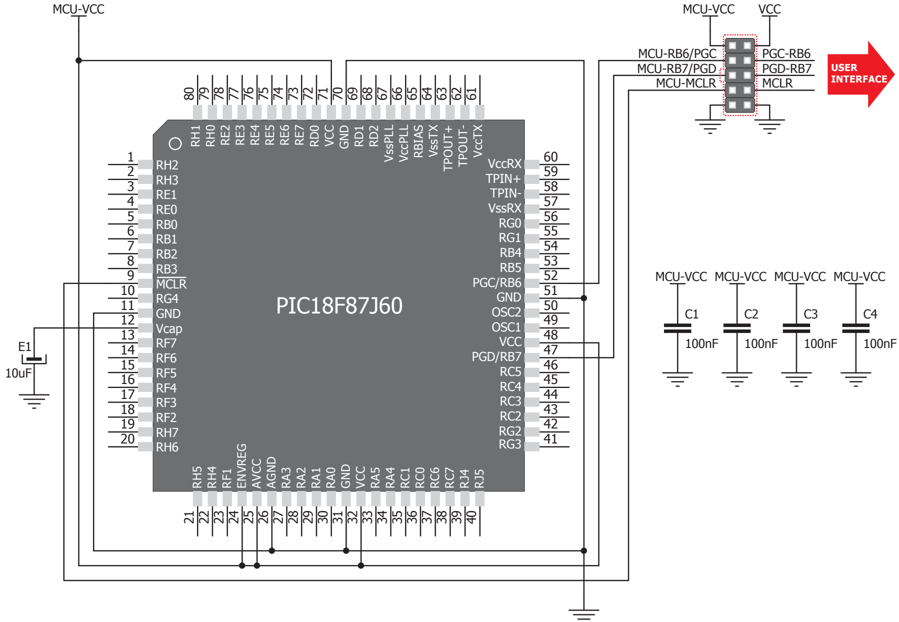
PIC18FJ TQFP80

Figure 10-6: Connecting 2x5 male header with PIC18F87J50 in 80-pin TQFP package



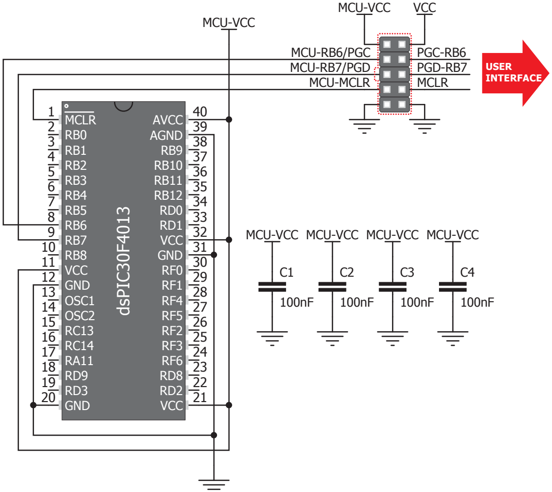
PIC18FJ TQFP80

Figure 10-7: Connecting 2x5 male header with PIC18F87J60 in 80-pin TQFP package



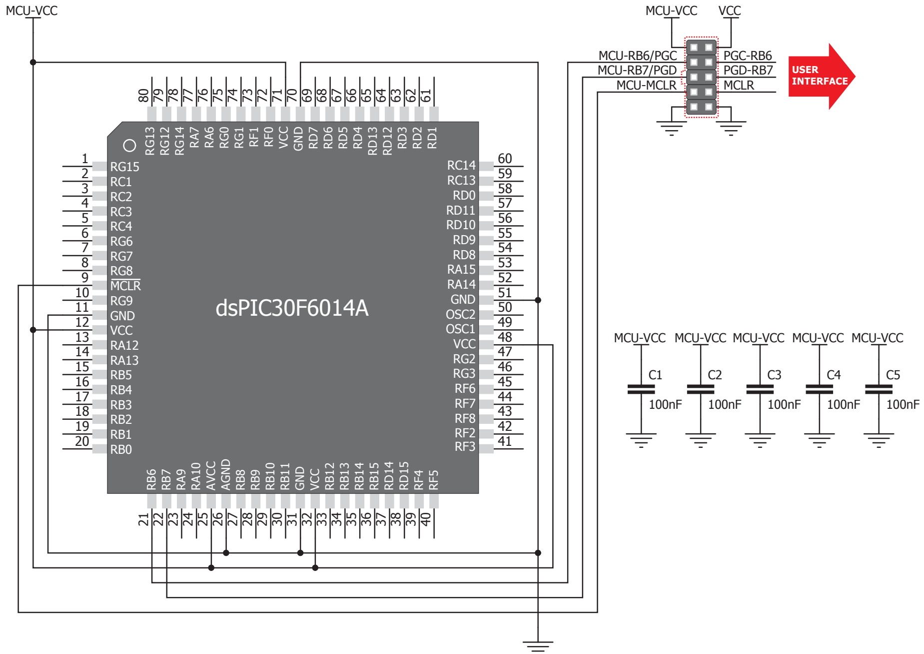
dsPIC30 DIP40

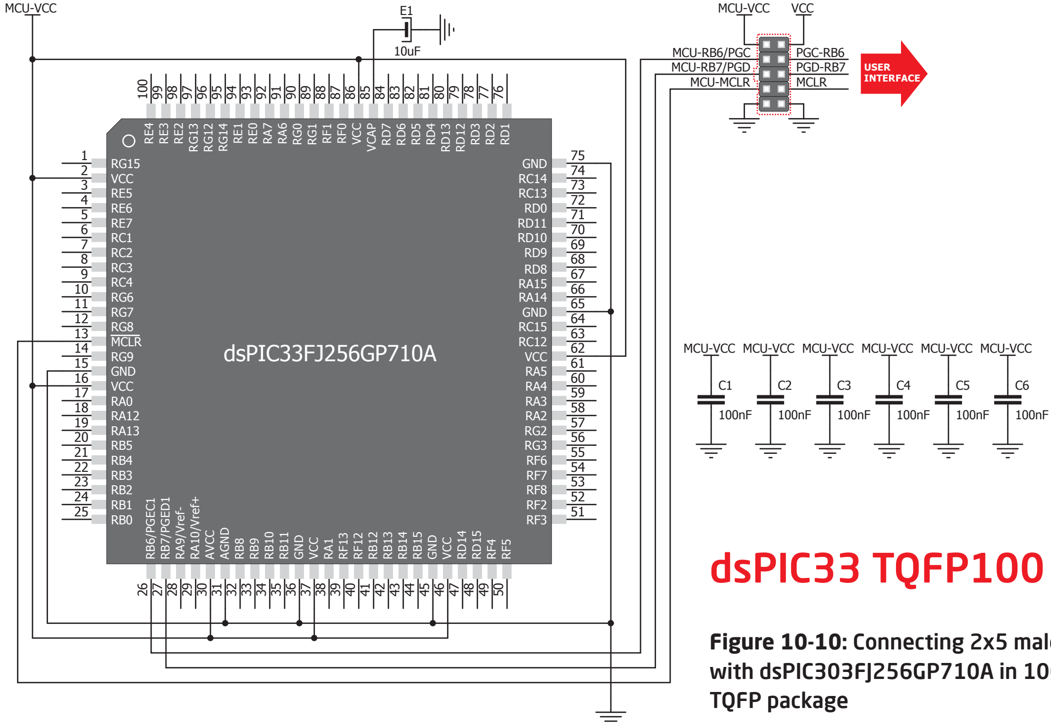
Figure 10-8: Connecting 2x5 male header with dsPIC30F4013 in 40-pin DIP package



dsPIC30 TQFP80

Figure 10-9: Connecting 2x5 male header with dsPIC30F6014A in 80-pin TQFP package



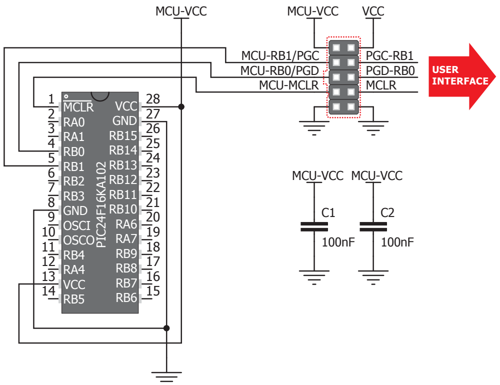


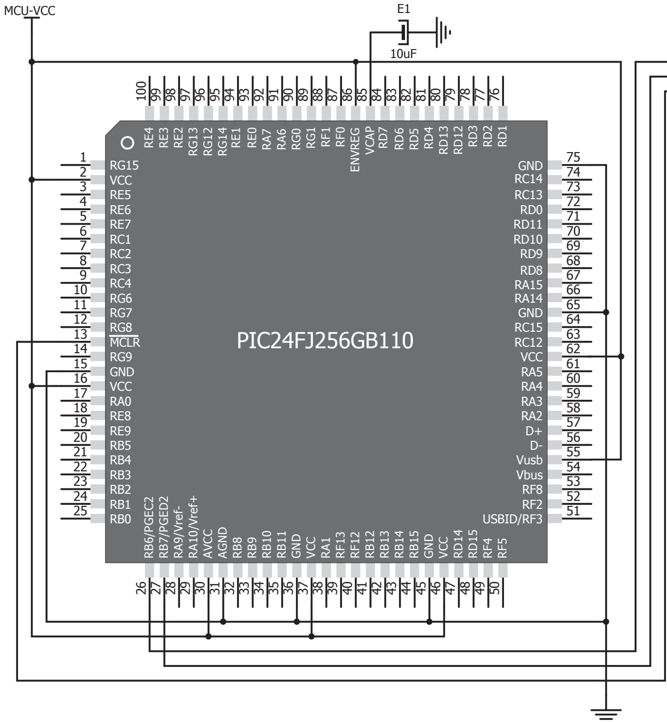
dsPIC33 TQFP100

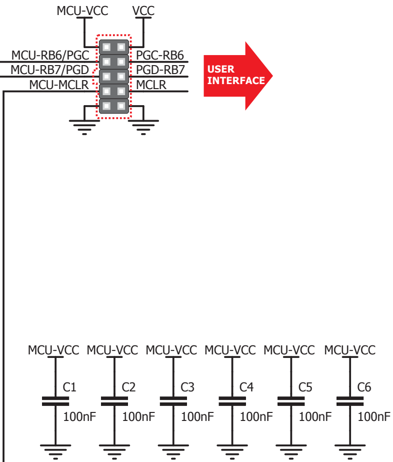
Figure 10-10: Connecting 2x5 male header with dsPIC303FJ256GP710A in 100-pin TQFP package

PIC24FK TQFP80

Figure 10-11: Connecting 2x5 male header with PIC24F16KA102 in 28-pin DIP package

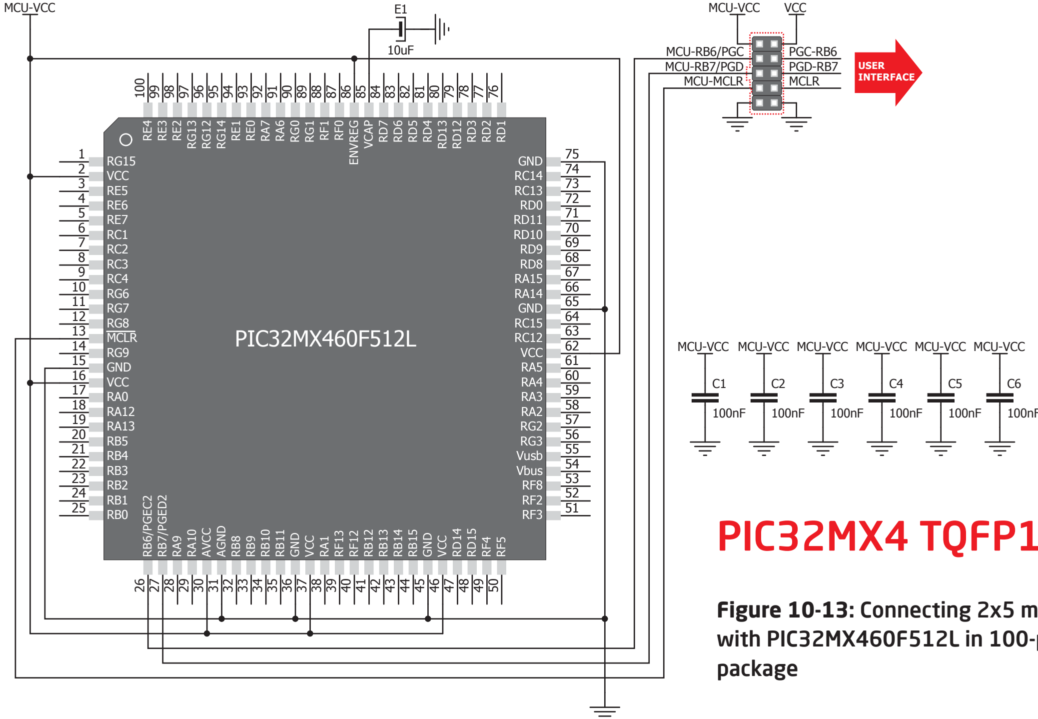






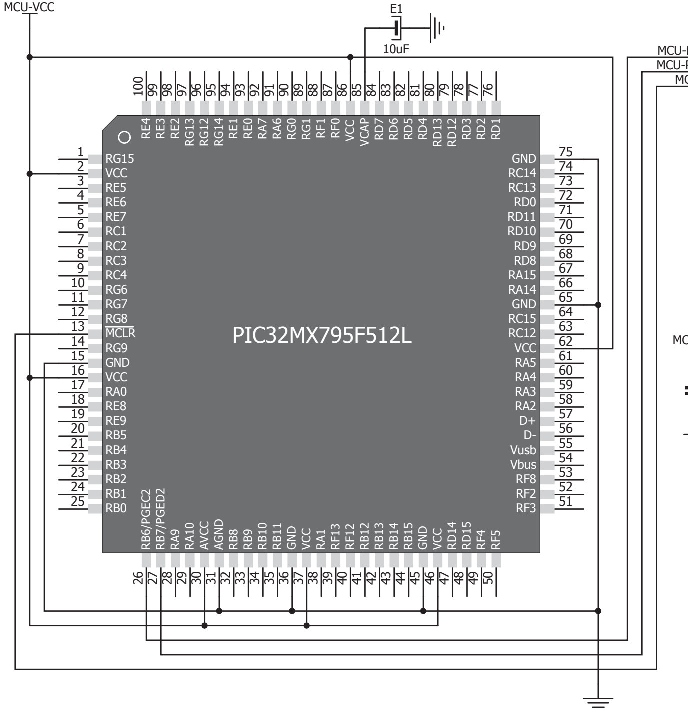
PIC24FJ TQFP100

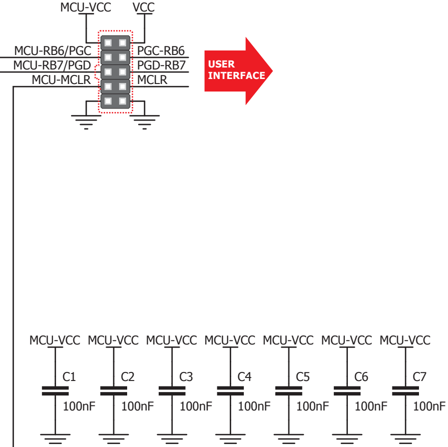
Figure 10-12: Connecting 2x5 male header with PIC24FJ256BG110 in 100-pin TQFP package



PIC32MX4 TQFP100

Figure 10-13: Connecting 2x5 male header with PIC32MX460F512L in 100-pin TQFP package





PIC32MX7 TQFP100

Figure 10-14: Connecting 2x5 male header with PIC32MX760F512L in 100-pin TQFP package

Notes:

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If you are experiencing some problems with any of our products or just need additional information, please place your ticket at www.mikroe.com/support/

If you have any questions, comments or business proposals, do not hesitate to contact us at office@mikroe.com

mikroProg for PIC, dsPIC and PIC32 manual, **ver. 2.21b**

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